

Invasive plant wins competition against its native cousin

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Root nodules. Credit: University of Illinois

Because of its aggressive behavior and its harmful effects, the invasive prairie plant *Lespedeza cuneata* has been added to several noxious weed lists.

Research at the University of Illinois on how [soil bacteria](#) interact with the plants' roots to form nodules that fix nitrogen demonstrated that the

invasive variety had superior performance when pitted against the native plant variety *Lespedeza virginica*.

"We expected *Lespedeza cuneata* to be a strong competitor when up against its native cousin that's planted primarily for prairie restoration," said U of I microbial ecologist Tony Yannarell. "There are a number of studies showing that *L. cuneata* grows quickly, is able to shade out its competitors, and has a high rate of [nitrogen fixation](#), which allows it to 'self-fertilize' on unproductive soils."

Yannarell explained that *Lespedeza* plants establish a "partnership" with bacteria in the soil to form nodules that fix nitrogen. "We wanted to demonstrate that the partners in this symbiosis matter," he said.

Because the nitrogen-fixing gene is in the bacteria, the first step in the research was to identify bacteria that have the gene. "We started with isolating a pool of 50 bacteria [from the root nodules of invasive and native *Lespedezas*] and discovered that some of them weren't traditional nodule-forming bacteria."

Ultimately, seven bacteria were identified and used in a three-month greenhouse experiment in which various combinations of native and invasive varieties of *Lespedeza* were grown together in pots. Of the seven, five bacteria were found to benefit the invader and two did not benefit either of the plant varieties.

"We were hoping to be able to change the degree of competitiveness by using different varieties of *Lespedeza* by varying the bacteria," Yannarell said. "It turned out that none of the bacteria seemed to be better for the [native plant](#)."

"A really intriguing pattern that we found is that a lot of these strains of bacteria that are good for the invader belong to the *Bradyrhizobium*

genus of [bacteria](#) that's been shown in other parts of the world to be good at fixing nitrogen so this was one more confirmation of that information," Yannarell said.

Yannarell said that this study provides yet another piece in the ecological puzzle.

The invasive *Lespedeza cuneata* was intentionally brought into the United States from Japan near the end of the 1800s. At the time, people liked its nitrogen-fixing capacity and soil fertilization. It was intended to be used to stabilize river banks and rehabilitate poor soil. Yannarell said that it has been recommended as wildlife forage, and some think that it has tannins that can act as a deworming treatment for goats. Now, however, it's considered to be a noxious weed that grows in the South and Midwest. It is commonly called silky bush clover.

Yannarell stressed that there are a lot of different species of *Lespedeza* that are native to North America and indicative of high-quality prairie. Although *Lespedeza cuneata* isn't a plant that would be intentionally planted by prairie restorationists, it has been seen in prairie seed mixes.

More information: "Invasive *Lespedeza cuneata* and native *Lespedeza virginica* experience asymmetrical benefits from rhizobial symbionts," was published in *Plant and Soil*.

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